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FIELD ENGINEERING (ALL ARMS)

MILITARY TRAINING PAMPHLET
No. 30

PART VI: DEMOLITIONS



1945

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*Prepared under the direction of
The Chief of the Imperial General Staff*

THE WAR OFFICE,
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21570

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DISTRIBUTION

RE.	Scale
M.A. Ltd (field master and MFG units), Resco and Pioneer units	B
Other arms	A
OCUs	II

GLOSSARY OF TECHNICAL TERMS USED IN DEMOLITION WORK

Blind. Ammunition which has failed to explode. Applied to projectiles, grenades, demolition charges.

Charge. The term used to indicate a quantity of explosive used in a demolition. Also used to indicate the quantity of propellant in a cartridge when applied to projectiles.

Combustion. A rapid process of burning. Applied to line explosives. See Sec 3, para 1.

Crimping. The method of fastening one object to another by squeezing with fluted plates. Applied particularly to fixing detonators on to safety fuse.

1—2—3—4

Detonation.

The process whereby a high explosive (HE) is converted in a minute fraction of a second into a volume of gas at very high temperature and pressure. The detonating wave travels through materials at speeds up to 290 miles a minute. See Sec 3, para 1.

NOT a form of burning. See Combustion.

Explosion.

Literally the rapid combustion or burning which takes place in *low explosives*. Also applied loosely to *detonation* which only takes place in *high explosives*.

Firing.

The process whereby an explosive train is initiated and the HE charge finally detonated. See *Initiation* and Sec 3, para 1 (last sub-para).

Fuse.

Applied to two different types of equipment:—

(a) A ready-made continuous train of explosive contained in a fibre tube and capable of being cut into appropriate lengths. See *Safety Fuse*, *Instantaneous Fuse* and *Detonating Fuse*, in text (Sec 5).

(b) The component in any round of ammunition that initiates the explosive train, by a combination of mechanical and explosive devices.

Igniter.

Aby device used to initiate safety fuse. Also loosely used to denote the initiating device in mines or grenades.

Initiation.

Literally the process of "starting" an explosive action. Applied either to the *detonation* of HE or the *ignition* of safety fuse, etc., e.g., safety fuse may be "initiated" (or "ignited") by an igniter, detonating fuse "initiated" by a detonator and a charge "initiated" by a primer.

Ring Main.

A circuit of detonating fuses used when it is desired to initiate several charges simultaneously. See Sec 5, para 3, sub-para (c).

Trailing.

The use of earth or sandbags around a charge to reduce waste of explosive effort.

MILITARY TRAINING PAMPHLET No. 30

FIELD ENGINEERING

(ALL ARMS)

PART VI

DEMOLITIONS, 1945

CHAPTER 1

GENERAL

SECTION 1.—INTRODUCTION—SCOPE OF PAMPHLET

1. This pamphlet is intended to assist in the training of arms other than the RE in the elementary use of the explosive with which they are issued or to which they may have access. For this reason the scope is limited, and if demolition tasks which are outside this scope are allotted to other arms, engineer advice should be sought.

2. Engineer officers and NCOs, who are concerned with the demolition training of other arms will notice that at certain points the demolition practice laid down in this pamphlet differs slightly from that in Military Engineering, Volume IV, Part I (1942), e.g., the use of the crow hitch on cortex connections. The reason for this is that it is not envisaged that other arms will normally be concerned with anything but hasty demolitions which will be blown as soon as the charges are prepared or very shortly afterwards. For this reason the standard engineer technique can be simplified.

SECTION 2.—SUPPLY OF EXPLOSIVES IN THE FIELD

1. Explosives are an ordnance supply obtained in the field from the supply companies, RASC, who carry them on standard-loaded explosive lorries. Demands are submitted through "Q" channels as for ammunition. Table I shows the present C.I.1958 holding of an infantry pioneer platoon. C.E./TNT demolition sticks, wet gun-cotton or explosive "808" may be issued for demolition purposes in lieu of 75 grenades in an emergency.

TABLE 1.—SCALE OF EXPLOSIVES CARRIED BY INFANTRY
PIONEER PLATOON

Note.—This table is correct at time of going to press. Variations are made to the scales from State to State, but it is not proposed constantly to amend the table.

Firecrackers, No. 75	...	...	...	108
Fuze, safety, Mk 2	...	...	...	292
Ignition, safety fuze, percussion	...	...	...	20
Ignition, safety fuze, striking ...	...	...	...	1
Matchbox, fuze	...	...	...	12
Detonators, No. 27, Mk 1	...	...	...	100
Detonating fuse (gunpowder or cordtex)	...	...	...	2,000
Primers, 1-oz C.F.	...	...	...	120
Tape, adhesive, 1-in	...	...	...	5
Tubes, fuze, sealing	...	...	...	100
Compound, sealing	...	...	...	1
Chrapers	...	...	...	2
Twine, sealing material, natural	...	...	...	2
Tulypwood, bangalore, 1/4-in (5 ft lengths)	...	...	...	24 (6 sets of 4)
Turpentine, bangalore, tinner	...	...	...	2

CHAPTER 2 EXPLOSIVES

SECTION 3.—THEORY OF EXPLOSIVES

1. **Low and high explosives.**—Low explosives are made of a mixture of substances which when ignited will burn extremely fast, producing as they do so a volume of gas at high temperature and pressure which expands very rapidly and tends to remove any solid obstacle in its path. This process is known as *combustion*. Low explosives have a high content of oxygen and they do not therefore require air for combustion, like wood or coal. Gunpowder or cordite are examples of this type of explosive; cordite is used mainly as a propellant charge for shells, bullets, etc., gunpowder as an igniting agent for propellant charge and also as a delay cord in fuzes, e.g., safety fuzes.

High explosives (H.E.) are composed of some chemically unstable substance which can be detonated by friction, shock, or heat. Detonation is the practically instantaneous conversion of the entire substance into gas and is carried through its bulk by a detonation or shock wave which travels at a speed of about 200 miles a minute. This is a far more rapid process than the combustion of low explosives, and the effect produced is a very violent shattering blow in addition to the pushing effect of the gases produced. If a pound of TNT (which is a high explosive) *detonates* in contact with a steel rail will produce a blow strong enough to cut the rail, while any quantity of gunpowder similarly placed and ignited will not cut the rail though it may lift it and propel it for a considerable distance.

An H.E. shell is propelled from a gun by a low explosive charge of Cordite. When it strikes the target the high explosive charge carried in the shell is detonated by a fuze and shatters the steel casing.

All service bulk explosives used in demolition are high explosives but their contents are stabilized so that a very considerable shock is required to detonate them. In practice they are detonated by a primer which is a small, more sensitive charge, itself requiring to be initiated by a detonator or detonating fuse. (See Sec 5.) Thus, the initiation of an H.E. charge may be compared to the lighting of a gun fire, with the primer corresponding to the detonator, the wood in the primer, the cord to the charge.

High explosives will burn slowly in an unconfined space. If in small quantities. If not alight in a confined space or in large quantities they will probably eventually detonate.

Details of the explosives likely to be used by arms other than H.E. are given in Sec 4.

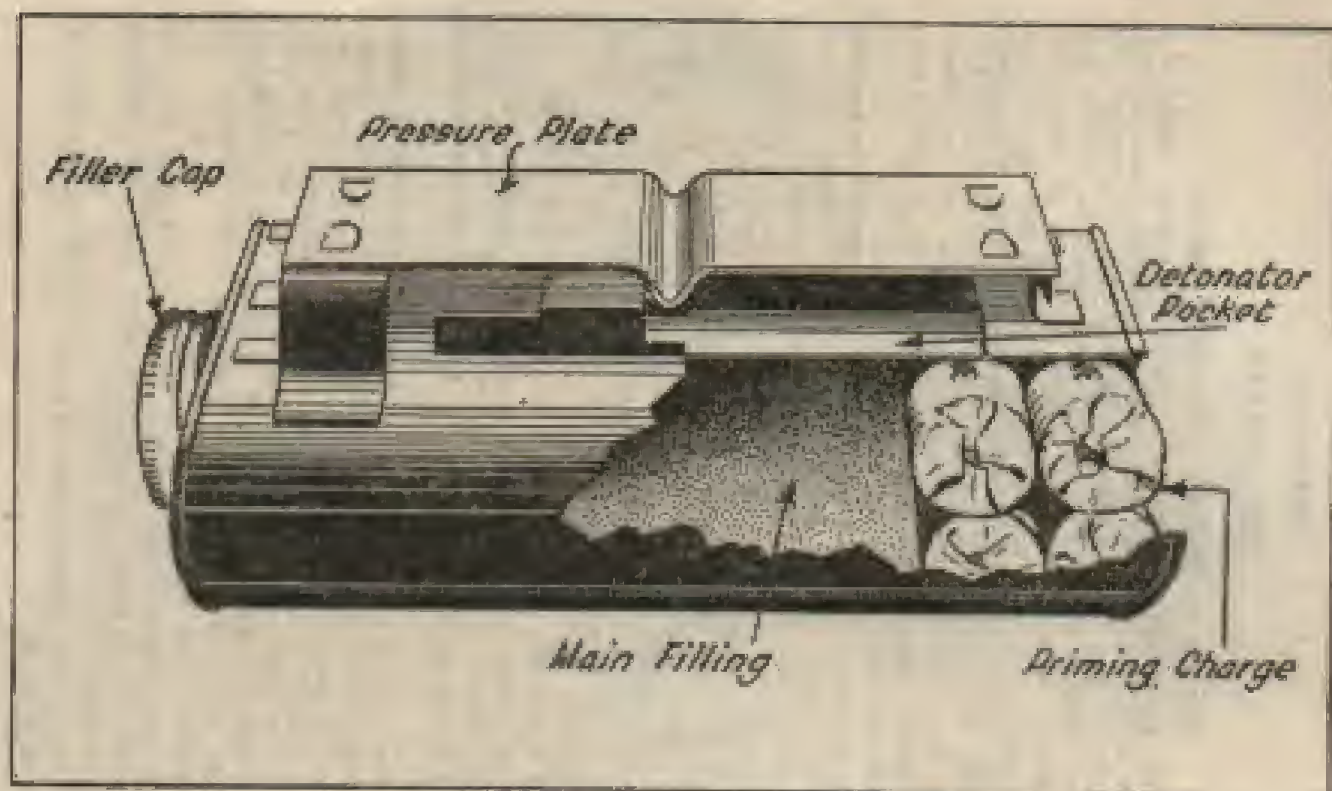


Fig 1. 75 grenade Mark 1, sectional view

SECTION 4.—SERVICE BULK EXPLOSIVES (likely to be available to arms other than ME)

1. No. 75 grenade (See Fig 1)

(a) *Description.*—This is a screw cap metal container filled with 1½ lb of HB with a special primer inside the container at the opposite end to the screw cap (see Fig 1). On top of the container is a pressure plate with special pockets underneath for the detonator and primer sets used when the grenade is employed as an anti-tank mine (see Military Training Pamphlet 40, Part 1). Twelve grenades are packed in a tin box with 24 detonator and igniter assemblies.

75 grenades do not readily deteriorate in temperate climates. In a tropical climate deterioration is more rapid. The grenade measures 7 ins by 3½ ins by 2 ins and weighs 8 lb.

The Mk 2 grenade should be used exactly as the Mk 1 in demolition work.

The grenade is the demolition charge which will be mainly used by arms other than the RE. The other bulk explosives described below may be found as replacements by the lighter set supplied for use when it is detonated as an anti-tank mine. If an attempt is made to initiate it with detonator and safety fuse or detonating fuse in case of the normal detonator holes, bulges up to 50 per cent may result. There are two reasons for this. First, when the detonator is fired by the lighter set *plz.* when in use as an anti-tank mine, the pressure on the plate tends to press the detonator down on to the priming charge. This does not occur when the grenade is used as a demolition charge. Secondly, the safety fuse may contract in length as it burns and draw the detonator back so that it is not directly over the priming charge when it explodes.

2. Demolition Slab. (ME/TNT)

(a) *Description.*—This is a milliliter container measuring 4½ ins by 2½ ins by 1½ ins filled with a yellow high explosive. The total weight is 1 lb. It has two holes for the special 1-oz explosive primer, which will not be inserted with the slab when it is used by arms other than the RE. Fourteen slabs are packed in a wooden box or a gunotton the box (see para 3 below). The slab has excellent keeping qualities in all climates, and is not affected by moisture.

(b) *Initiation*.—The slab is satisfactorily initiated with a 1 oz. primer loaded on as shown in Fig. 4.

3. Guncoction (wet) slab

(a) *Description*.—This slab is composed of a fibrous substance, dirty white in colour, measuring 6 ins by 3 ins by 1½ ins, weighing 1½ lbs in all. This includes 3 ozs of water, which is the correct water content. Fourteen slabs are packed in a sealed tin box inside a wooden crate. In temperate climates guncoction is very stable and safe to use, provided the water content is kept correct. This can only be done by keeping the tin sealed until the slabs are to be used. If allowed to absorb too much water (from the air or in other ways) the slabs will become inert and useless. In hot, dry weather the slabs tend to lose their water content and become flaky. In this condition they are dangerous to use, and they are therefore not suitable for use in very hot climates. In very cold weather the water in these slabs will freeze, and the slabs will stick together in the tin, being dangerous and difficult, if not impossible, to extract.

(b) *Initiation*.—The slab has a tapered hole to take the normal 1-oz primer, see Sec 5, para 1, and will always be initiated by this primer.

4. Explosive "808" (plastic)

(a) *Description*.—This explosive is issued in 4-oz cartridges 3 ins long by 1½ ins in diameter, wrapped in paper. The cartridge is light blue in colour and plastic like plasticine. 5 lbs are packed in a cardboard box and four boxes are packed in a wooden box approximately the same size as the guncoction crate. "808" is a very stable high explosive with a wide range of uses. It has good keeping qualities in cold or temperate climates, but is affected slowly by moist tropical heat. It can be used under water. It is very inflammable and may be set alight by small arms fire. If the cartridges are handled with the bare hands they may cause a temporary headache. They should not therefore be unwrapped. Earlier issues of "808" were not plastic but rubbery in composition and were coloured yellow, green or purple. This form is not so easily handled and is no longer being made.

(b) *Initiation*.—"808" will always be initiated by a 1-oz primer, which should be inserted freely to the end of one cartridge in the centre of the charge.

5. *General*.—The following points should be noted with regard to service high explosives.

(a) They are perfectly safe to handle so long as normal care is exercised as with ammunition.

(b) Weight for weight all service bulk explosives already described may be taken as having the same power, the 75 grenade being taken as the equivalent of one CE/TNT or guncoction slab or 4 cartridges of "808".

(c) For cutting charges (see Sec 8) an uneven surface on plastic "808" if available as this explosive can be moulded against the surface to be cut. For examples see Secs 5, 9, and 10.

(d) For charges to be fired under water or in damp situations avoid using guncoction except in unbroken sealed tins, unless it is to be fired immediately. Explosive "808", CE/TNT slabs or 75 grenades can be fired under water without the charge being waterproofed. See Sec 9, for arrangements are waterproofed. See Sec 9.

(e) A rifle bullet striking a charge of guncoction, CE/TNT or "808" will probably not detonate it, but there is a strong chance that "808" will be set on fire. A 75 grenade may detonate if a bullet hits the end containing the primer.

Primers (see Sec 5, para 1) may be set on fire or detonated by a rifle bullet.

SECTION 5.—FIRING ACCESSORIES

1. *Primers*.—Owing to the insensitiveness of all British service explosives they require a small charge of a more sensitive explosive to detonate them. This charge is known as a primer, and itself requires to be initiated by a standard detonator (see para 2) or detonating fuse (see para 3). In certain made-up charges, such as the 75 grenade, special primers are incorporated, and such charges do not require one of the primers described below in addition.

Two types of primer are generally used:—

(a) *CE primer*.—This is a tapered 1-oz "cylinder" of Compustick Explositive encased in a waxed paper covering, which will fit into the hole in a guncoction slab. It has an internal hole to take a service detonator. The waxed paper covering, so long as it is kept intact, makes this primer waterproof.

(b) *1-oz dry guncoction primer*.—This is the same size and has the same general appearance as the CE primer but is completely waterproof. This acetone covering is very easily stripped and broken, and if this occurs moisture will get into the primer and make it inert. For this reason CE primers should be used in preference to guncoction primers when possible.

(c) *General*.—Both types of primers are usually packed 10 in a tin or carbide cylinder, and 6 cylinders in a wooden box. Primers are considerably more sensitive to shock than bulk HE, but at the same time they are perfectly safe to handle if reasonable care is exercised. As already noted they may be set on fire or detonated by a rifle bullet.

Note.—For fusing and initiation of primers see Figs 3 and 4.

2. *Detonators*.—The standard service detonator is the No. 27 Mk. 1, which is used for initiating service primers and detonating fuses. It consists of a small metal tube 1½ in long, closed at one end, and will fit into the axial hole in the service primers described above. The tube is half filled with sensitive HE which will detonate when initiated by safety fuse or instantaneous fuse. No. 27 detonators are packed in special tins, 25 in a tin. The tins may also contain a fuze, which is a small wooden coil used for increasing slightly the size of the hole in Mk. 1 gunpowder primers when the detonator will not fit. It is unlikely that there are any of these primers still in operational use.

No. 8 commercial detonators may be found in line of the service No. 27, and have identical properties. Commercial detonators are packed in sawdust, 100 in a square tin. Care must be taken to empty sawdust from the detonator before using.

When inserted into the primer the closed end of the detonator should be about ¼ in short of the far end of the axial hole, the object being to get the filling of the detonator in the centre of the primer. It is IMPORTANT that the detonator should not protrude on the far side of the primer. This may cause failure.

Occasionally detonators are extremely sensitive and may detonate even if dropped on hard ground. They should be treated therefore with care. In particular NEVER APPLY PRESSURE TO THE SEALED END OR POND THE FILLING WITH ANYTHING FLAMMABLE SUCH AS A PIN OR MATCH STICK. The explosion of a detonator in a man's hand is sufficient to blow off several fingers.

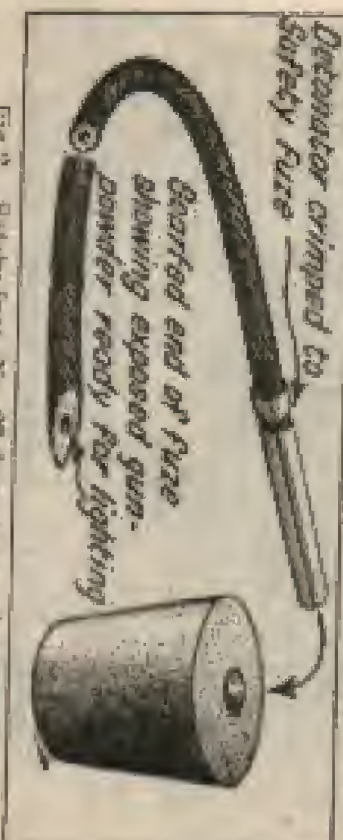


Fig 2. Safety fuse, No. 27 detonator and fuze, primer

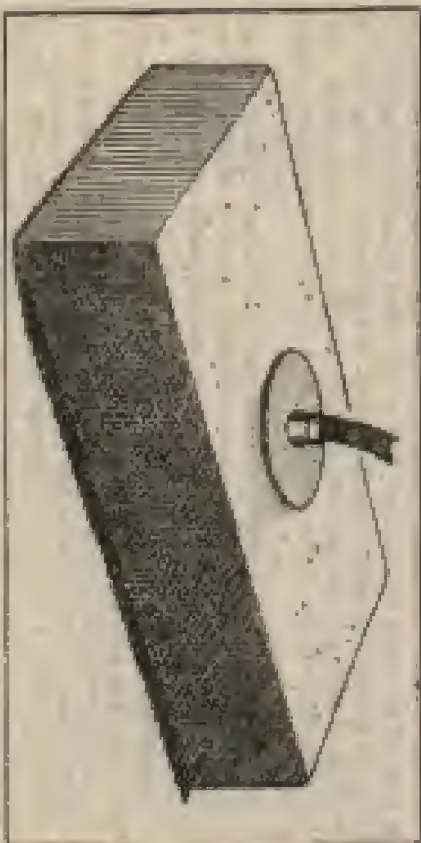


Fig 3. Gunpowder slab with primer, detonator and safety fuze

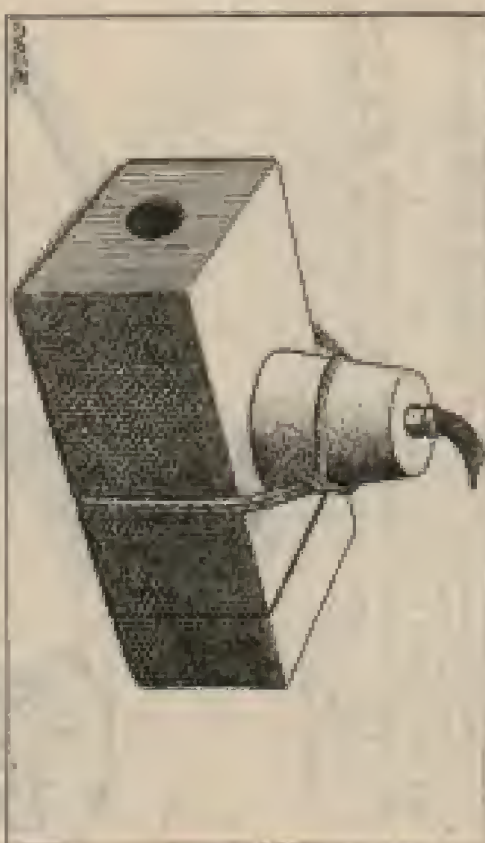


Fig 4. CE/TNT slab with primer, detonator and safety fuze

For special notes on storage of detonators see Sec 7. Fig 2 shows the normal method of initiating the detonator with safety fuse. This is fully described in para 4 below.

3. *Safety fuze*.—The standard British service safety fuze No. 11 Mk. 1 has a black gunpowder core in a black waterproof cover. The fuze is packed 48 ft in a sealed cylindrical tin. If the sealing of the tin is found to have been broken the fuze should be treated with suspicion as it may have been affected by damp. The gunpowder core is extremely susceptible to damp and quickly becomes useless if exposed

to the air. For this reason each time the tin is opened it has should be cut off the end of the reel before the reel is used. Safety fuse burns at a rate of approximately 2 ft per minute, but the rate of burning of any particular reel should always be tested before use. This can be done by cutting off 1 ft and checking the time it takes to burn.

Although the variations in burning speeds of safety fuse are small (2 ft per minute ± 2 seconds), no two lengths of safety fuse ever burn at exactly the same speed even if taken off the same reel and cut as exactly to length as possible.

Consequently safety fuse should NOT be used for the simultaneous initiation of a number of charges.

A commercial fuse known as "Blue Bump" may be issued in lieu of service fuse. This cover is blue, but its other properties are similar. The following precautions should always be taken with safety fuse:—

- (a) ALWAYS cut off and test a short length of fuse for rate of burning before use. If it burns too fast or is in fact instantaneous fuse (see para 6) the fact will be discovered without an accident.
- (b) Never use a length shorter than 6 ins.
- (c) Avoid detaching safety fuse by squeezing it or putting heavy weights on top of it. Such treatment may dangerously increase the rate of burning.
- (d) Keep the tin shut and sealed when not in use.



Fig. 5. Crimping Fuse

Insert shown method of crimping detonator on to safety fuse

4. Use of safety fuse

- (i) *Inserting safety fuse into detonator.*—Cut one end of the fuse with a sharp knife on a hard surface, taking care to make a clean cut; take a detonator from the box and empty any squared or other foreign matter out of it by tapping on the thumb-nail. Insert the squared end of the safety fuse into the detonator and push it gently, but firmly as far as it will go. Do NOT employ any screwing action. Hold the safety fuse between the third finger and thumb and crimp the detonator on to the fuse near the open end with a pair of crimping pliers, holding the detonator in place with the forefinger while doing so (see Fig 6); or use the match-edges of a jack knife. The use of the teeth is not recommended. NEVER CRIMP THE DETONATOR NEAR THE CLOSED END.

- (ii) *Lighting safety fuse.*—Safety fuse can be ignited with ordinary matches, matches fused (a special demolition store), or one of the types of igniter described below. When igniting with ordinary matches or matches fused, cut the end to be lit diagonally (see Fig 5). Then, if using ordinary matches, bury the head of the match in the exposed core and rub the box along the match head. When using matches fused, simply light the match head in the normal way and apply it to the core. Where safety fuse is not to be lit for some time after the charge has been prepared special precautions against damp must be taken (see Sec 5). Matches must be kept dry at all times.

The following lighters may be used for lighting safety fuse. For both lighters the end to be lit should be cut square, and inserted as far in as it will go.

- (i) *Igniter, safety fuse, percussion.* (See Fig 4).—

Crimp the small brass tube which extends from one end of the igniter on to the square-cut end of the safety fuse. When the fuse is to be lighted pull out the safety pin at the other end of the igniter by means of the ring attached to it. Pulling out the safety pin releases the striker which fires the cap and ignites the safety fuse.

These lighters are issued packed in sealed tins of 10. The caps are easily damaged by damp, so that one should not be used until the igniter is dry. Always use up all the lighters in one tin before opening another. Keep the tin shut when not in use.

- (ii) *Igniter, safety fuse, striking.*—This is a small copper cap with wire match composition at the end;

25 are packed in a small tin. This cap is crimped over the end of the safety fuse, which is cut square. To light the safety fuse rub the match crimped on along the outside of a safety switch box or special burner. These lighters are also very susceptible to damp, the composition on the end being similar to that on a safety match. Therefore keep the tin shut and use up one tin before opening another.

(iii) *Safety percussion when using igniters.* NEVER use less than 8 ins of safety fuse. Always clamp the igniter firmly on to the fuse.

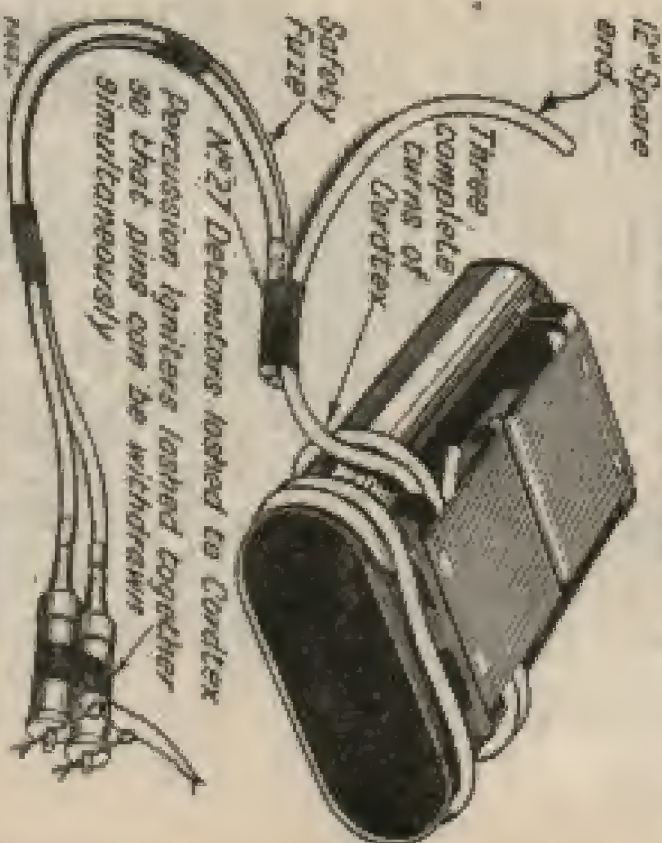


Fig. 8. No. 27 Detonator connected to Cordtex percussion igniters.

(c) *Failure of charges with safety fuse and detonator.*—There are several common causes of failure with a safety fuse and detonator initiating set. These are:—

Failures at the detonator end of the safety fuse, caused by:—

(i) The end of the fuse being roughly cut, resulting in either the gunpowder core being pulled out of the end, or the covering being frayed and blocking the "split" of flame from the fuse on to the detonator.

(ii) The end of the fuse being damp, resulting in the fusing out of the gunpowder core. This may be caused by the end of the fuse being damp to start with, or by the detonator containing a few drops of moisture which damp the end of the fuse after insertion, or by the fuse becoming damp after assembly through lack of protection.

(iii) The end of the fuse not being hard up against the biting of the detonator, either because it was not pushed home originally, or because it has been pulled back slightly after peep crimping, or because of failure to remove sawdust or other foreign material from the detonator.

Failures at the igniting end of the safety fuse, caused by:—

(iv) The end of the fuse being damaged as in (i) above.

(v) The end of the fuse being damp when inserted into the igniter or becoming damp after insertion, as in (ii) above.

(vi) The fuse not being hard up against the cap as in (iii) above.

All these failures can be avoided by taking particular care:—

To use dry stores.

To make up the sets, in accordance with para 4 (a), using a sharp knife, cutting on a firm surface, etc.

To protect the sets from rough handling and damp after assembly.

All ranks concerned must understand the possible causes of failure and must also realize that however much care is taken, no initiating set can ever be guaranteed as 100 per cent certain. The set cannot be tested as the only test is to fire it. Consequently all important demolition work, particularly assault work, and preferably always, **TWO INITIATING SETS SHOULD BE USED.** This gives a reasonable guarantee against failure. The use of two sets, whatever the importance of the job, is a good habit to form (see Fig. 9).

It must be realized that a successful demolition depends primarily on successful initiation of the detonators, and that the safety fuse is the weakest link in the chain.

It is emphasized again that damp is the chief enemy.

5. **Detonating fuse.**—Safety fuse is unsuitable for setting of several charges simultaneously (see para 3 (e)), or for a charge which is remote from the firing point, owing to the very long lengths which would be required and the time involved. In such cases therefore detonating fuse is employed. The speed of detonation of this fuse is approximately 200 miles per minute. Detonating fuse is described in sub-para (a) below. British detonating fuse is known as *Cordtex*.

(a) **Description.**—*Cordtex* is a white double cord about 1 in. in diameter with a high explosive core. It will fit into a detonator. The explosive core is a white powder.

Cordtex is supplied on wooden reels carrying 500 ft. The covering of the fuse is waterproof, but the core is rendered insensitive by damp which may enter through the end. For this reason 12 ins should always be cut off the reel and discarded before use, and a 12-in spare end left on joints. Detonating fuse should be handled with care in the same way as bulk high explosives.

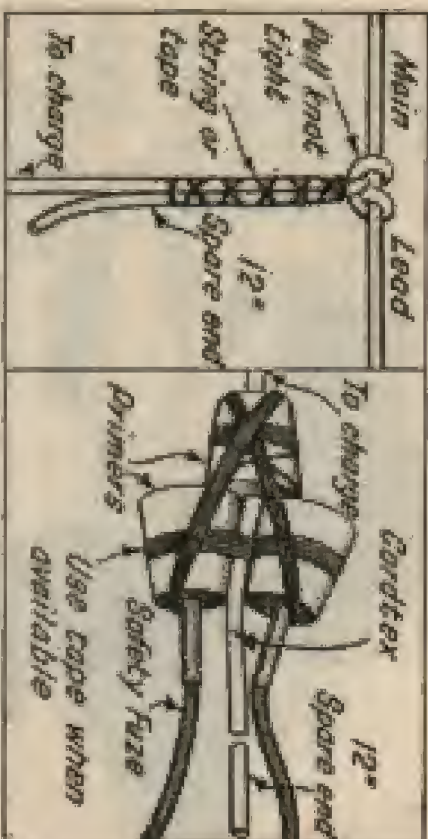


Fig 7. Cordtex clove

Fig 8. Alternative initiation of cordtex

(b) **Initiation.**—*Cordtex* can be initiated by any detonator, but for the reasons given in para 4 (c) above two detonators should normally be used each with its own safety fuse. Lead the detonators firmly to the fuse as shown in Fig 11. See that the detonators are in good contact with each other as well as with the detonating fuse. It is particularly important that the closed ends of the detonators are lashed on in good contact with the fuse. The smallest gap may well cause failure. In emergency one detonator and safety fuse may be used. Where the detonating fuse is unimpacted

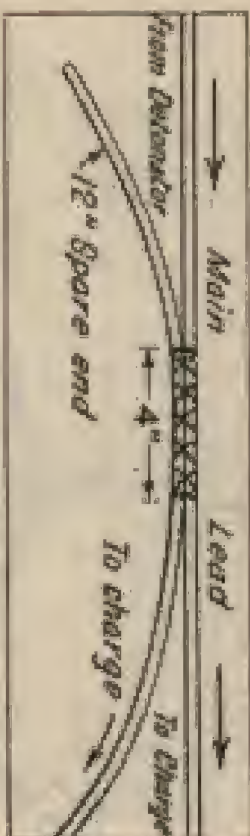


Fig 9. Cordtex lap joint—Not to be used on ring main



Fig 10. Cordtex junction box

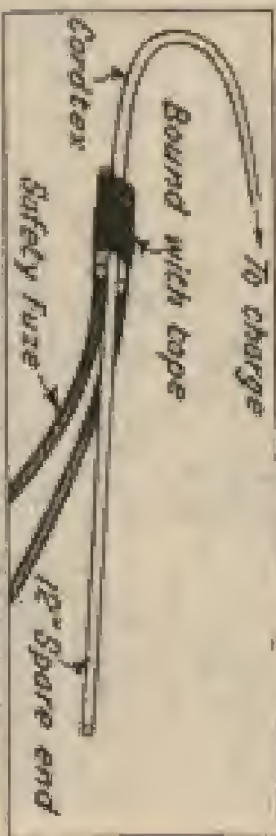


Fig 11. Initiation of cordtex fusing 2 detonators to initiation of lead of lead

of being damp or where the demolition is very important initiate the fuse with 3 primers, 2 detonators and 2 lengths of safety fuse as shown in Fig 8.

(c) **Joints.**—The detonating 'wave' will pass from one *cordtex* lead to another if there is sufficient contact. Such contact can be achieved by 'tying the branch lead round the main lead with a clove hitch' (see Fig 7). This knot must be pulled tight. Alternatively, joints can be made by lashing the two leads concerned together so that they are in good contact for at least 4 ins (see Fig 9). Multiple junction boxes can also be made up in this way (see Fig 10). **MAKE ALL SPARE ENDS IN JOINTS OF ANY KIND AT**

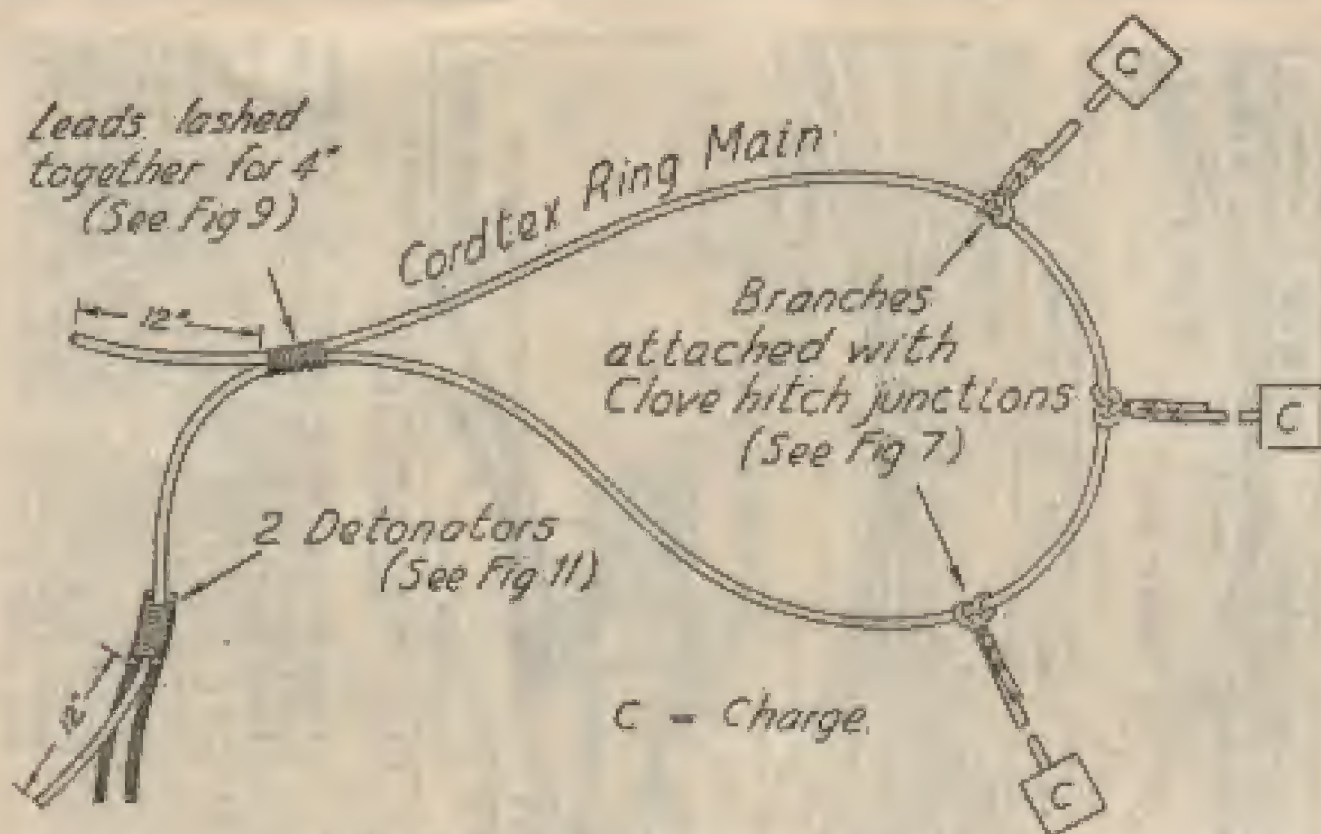


Fig 12 - Simple cordtex or primacord ring main

- LEAST 12 INCH LONG. If the 4-in lap joint is used the branch should come off the main in the direction in which the detonating wave will travel, like the points on a railway track. The detonating wave will not normally cross a lap joint which leads off the main in the wrong direction, just as a train cannot "jump" points which are in the wrong direction. In the case of a ring main (see sub-part (a)) ALL 4 VS are close-knit junctions.
- (d) Firing charges of 75 grains, CEPTX, TC or "grog" with defusing fuse.—As already stated, all charges should be initiated by a primer. To initiate a primer run the end of the fuse through it and tie a thumb-knot in the end of the fuse to prevent it from coming out. If this is not convenient, wedge it in with a small piece of wood or paper.
- NOTE.—The 75 grain has a special primer incorporated in it and is initiated with 3 turns of cordtex round the end opposite the filler cap as shown in Fig 6.
- (e) Ring mains.—The most efficient method of firing more than one charge simultaneously is by the use of a ring main made up with detonating fuse (see Fig 12). The main is initiated with two detonators and two lengths of safety fuse as already described.
- (f) Primacord.—This is the standard American detonating fuse and has a yellow braided cover. It is issued in 100 ft reels. The proportions are exactly similar to those of cordtex and it should be used in exactly the same way.
- g. Instantaneous fuse.—This is a thick orange-coloured fuse with a black gunpowder core which burns at approximately one mile per minute. It is NEITHER A DETONATING FUSE NOR A SAFETY FUSE. Take safety fuse the core is very susceptible to damp. It can be ignited by any lighter already described, or any of the bootie trap switches described in Military Training Pamphlet 40, Part I. NEVER ATTEMPT TO REWIRE THIS FUSE BY HAND, but always by remote control, e.g., percussion igniter and trip wire, etc. Attempts to ignite by hand will cause at least serious burns, and if there is a charge at the other end of the fuse serious accidents may result. INSTANTANEOUS FUSE IS TOO THICK TO INSERT INTO A DETONATOR UNLESS THE OUTER COVERING IS STRIPPED BACK.
- Use this fuse for bootie trap training ONLY (see Sec 17).
- NOTE.—A wet condenser, with "first instantaneous defusing" (FID) which is an obsolescent defusing fuse in a lead tube. Also avoid confusing with American service safety fuse, which also has an orange cover and which, like British safety fuse, will fit into a detonator without any stripping.

SECTION 8.—PRECAUTIONS AGAINST DAMP

1. When charges are to be fired soon after they have been made up, either because they are left in position or are being carried by the unit until required, or when they are to be placed in situations which are wet or may become so, the following precautions should be taken:—

- (a) Have all lengths of safety fuse 6 in longer than required and sealed as described in sub-para (b) below. Igniters found are not available the end of the safety fuse may be protected from damp by placing it inside an empty 300 cartridge case bound up with insulating tape. Safety fuse with igniters wetting crimped on the end should be protected from damp in the same way. The cartridge case will fit over the igniter.
- (b) Seal all square ends of cordex (or primacord) by crimping a tube, fuse sealing on to the end and dipping twice into sealing compound. Tubes, fuse sealing and the sealing compound are supplied in the C. 1009 explosives stores of the infantry pioneer platoon.
- (c) Seal igniters and detonators on to the safety fuse by dabbing compound round the joint between the two. Do not dip detonators into the compound otherwise it will be too tight to fit in a primer. If no compound is available bind the joint with insulating tape.
- (d) Avoid using gunnison slabs.
- (e) Use CE primers in preference to gunnison primers.

SECTION 7.—STORAGE OF EXPLOSIVES

The following precautions should be taken when storing explosives.

1. Store in a dry cool place with good cover and ventilation.
 2. See that the explosive store is at least 200 yds away from other buildings.
 3. Keep the explosives above floor level on sleepers or duck boards.
 4. Keep detonators well away from other explosives, if possible in another building or with a blast-proof sand bag wall between them and the main explosives store. On the move keep detonators in a separate truck from other explosives if possible—if not, keep them separated on the truck.
 5. Do not remove explosives from their boxes or packages until they are about to be used. Avoid having several half empty boxes.
- Note.—These precautions are the practical minimum for active service conditions.







CHAPTER 3.—TYPICAL USES OF EXPLOSIVES

Note.—In the following examples the quantity of explosives required is given in numbers of 75 grenades, as these are most generally available. One slab of gunnison or CE/TNT or four cartridges of "808" may be taken as roughly equivalent to one grenade. If "808" cartridges are used load them firmly together and bullets with a primer in the centre of the charge. As already mentioned, Plastic "808" can be moulded to the shape required.

SECTION 8.—CUTTING CHARGES—GENERAL.

1. 75 grenades or slabs of gunnison or CE/TNT or cartridges of "808" placed end to end and across the object to be attacked, and in good contact, will cut through the thickness shown in Table 2.

TABLE 2.—CUTTING CHARGES

Explosive thickness			Cross section of charge			
Mild Steel	Timber	Meaning of thickness	No. of slabs, etc., in series of charges	75 grenades	Slabs of CE/TNT	Cartridges of "808"
1 in	4 in	14 in	1 slab or 4 primers 3 cartridges "808"			
2 in	32 in	40 in	4 slabs 5 cartridges "808"			

* Cutting in the above thickness of penetration of the explosive used in 75 grenades is assumed that they are 200 lb and the thickness greater than those shown in the first line of the table.

2. The following points are important in connection with cutting charges:—

(a) *Line charges*.—Two charges must be continuous over the length of the cut. Then, to cut a steel plate 2 in thick and 16 in wide the following will be required:—

12 CE slabs (length of slab 6 in).

16 CE/TNT slabs (length of slab 4 in).

48 cartridges "808" (length of cartridge 3 in).

Note.—An exception to this rule is the charge shown in Sec 12 for brick walls up to 9 in thick.

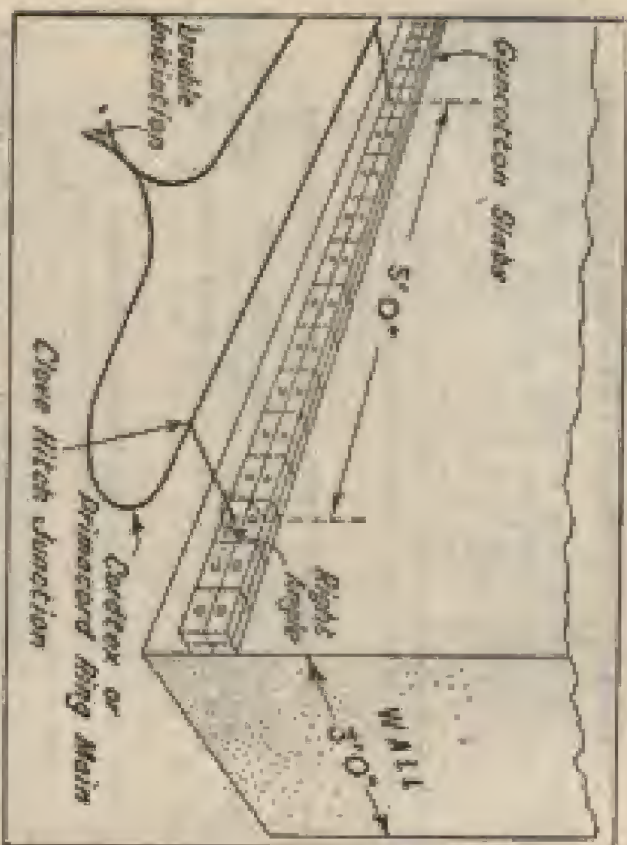


Fig. 13. Cutting charge on thick masonry wall, showing points of initiation. (Firing initiated from clarity)

- (b) Long continuous cutting charges should have joints of initiation (primers fired by cordtex, etc., as already described) every 5 ft of their length (see Fig 13). Grenades, however, should be placed flat end to flat end, with every other grenade initiated by cordtex. Where possible initiation should be on the surface of the charge furthest from the face of the object attached and at right angles to it (see Fig 13).

(c) Contact.—The importance of good contact has already been mentioned. Charges should be in contact with the surface attacked and voids underneath should be filled with clay or moist earth. Sand is not a good material for packing. The packing should only be thick enough to fill the voids. If it is thicker it will absorb some of the shock of detonation and reduce the cutting effect of the charge. Charges should be lashed or strapped firmly to hold them in position. Winding with wire is often the most convenient method of securing a charge.

SECTION 9.—CUTTING STEEL RAILS

For attacking rail obstacles use one 75 grenade or one slab of CE/TNT or C2, placed on the rail as shown in Fig 14. These charges if placed in good contact will be sufficient to cut the heaviest rail normally used. Note the importance of packing in this case. If plastic "808" is available it cartridges (two extra for convenient firing) can be used and no packing is necessary.

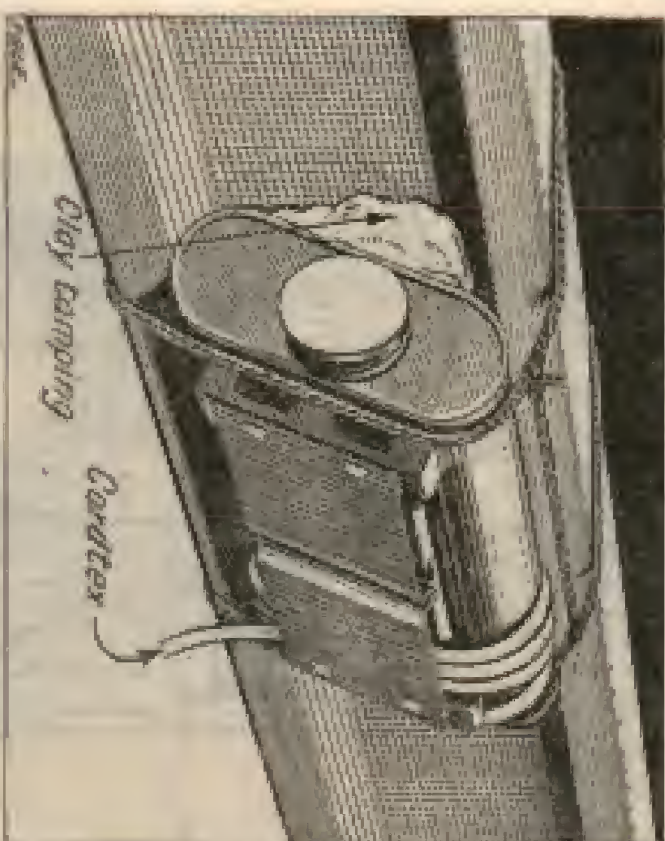


Fig. 14. No. 75 grenade fastened to cut rail. Note: If shels are used place across rail

SECTION 10.—FELLING SMALL TREES ON TELEGRAPH POLES

Small trees or telegraph poles up to 12 in. diameter may be felled by mining two 75 grenades or the equivalent placed as shown in Fig. 15. If time permits the tree or pole should be notched to give better contact for the charge. If plastic "808" is available this will not be necessary. The tree will fall towards the charge unless it is already leaning in the opposite direction. If necessary the direction of fall can be controlled by attaching a rope to the top of the tree and pulling in the required direction, the charge being placed on the side in which the tree is required to fall.

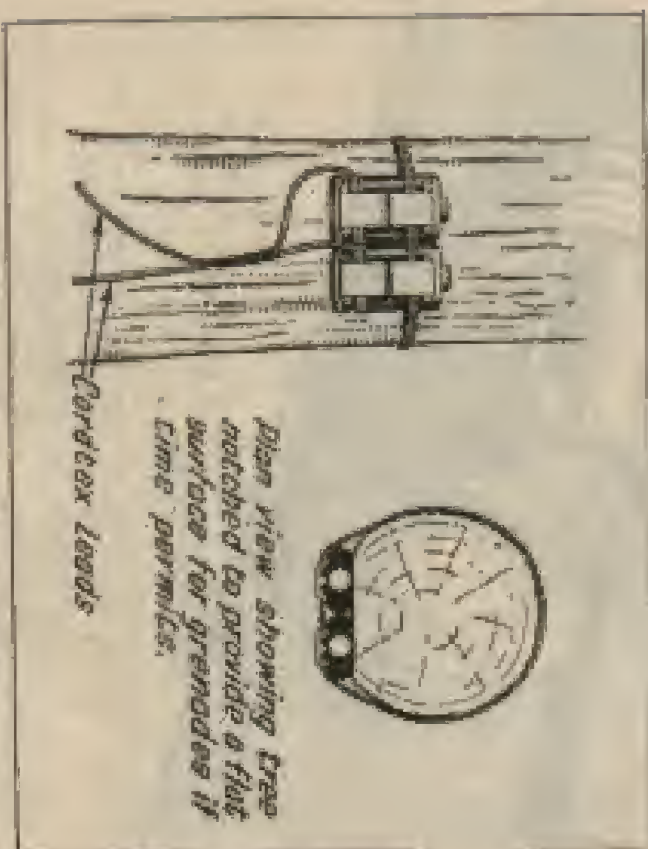


Fig. 15. Tree felling using 75 grenades

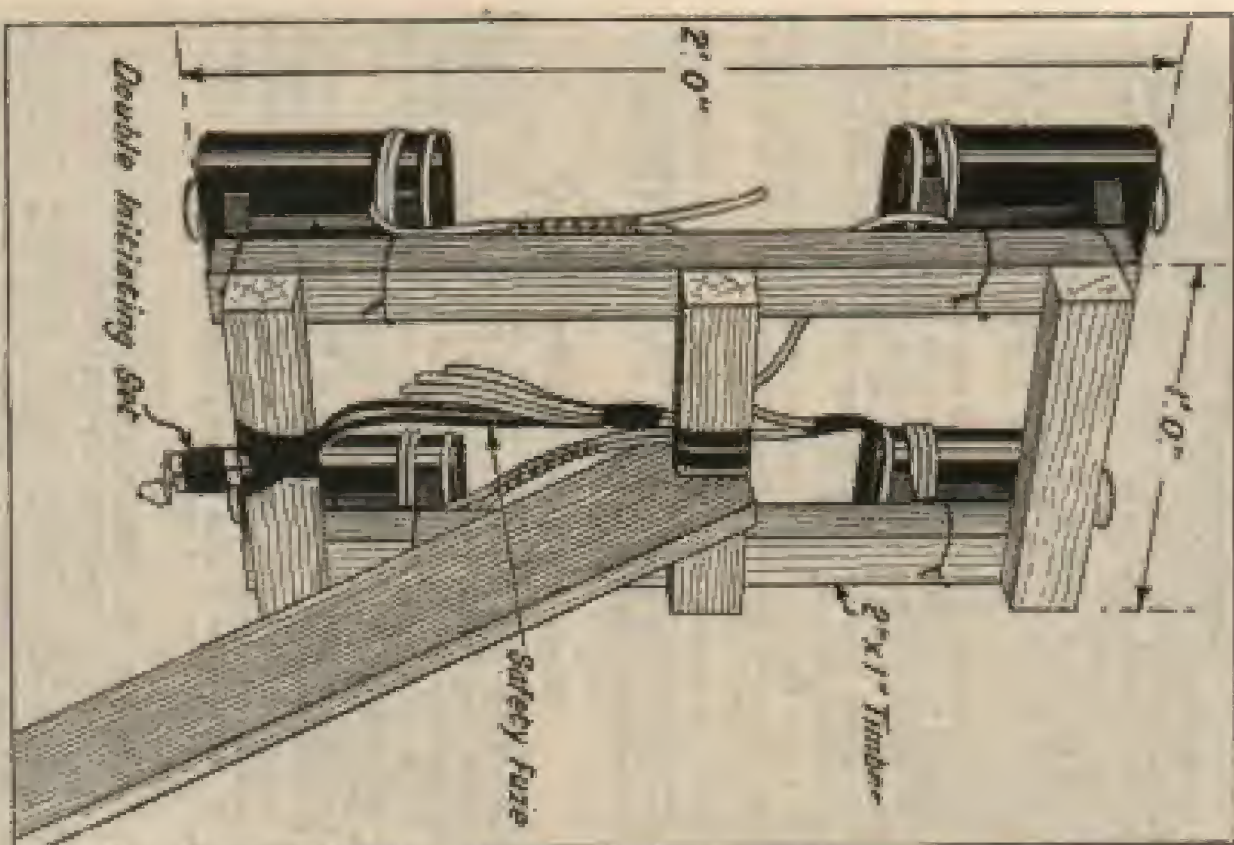


Fig. 16. Pole charge for "muzzling"

SECTION 11.—BREAKING THROUGH WALLS— (MOUSEHOLING). (See Fig 16)

An 18-in brick, masonry or unreinforced concrete wall may be broken successfully by placing against it four grenades lashed to a suitable wooden frame 2 ft by 1 ft made up of pipe diameter (2 in by 1-in or similar).

Each grenade is wired on to the frame and initiated by cordtex in the normal way. The four leads are lashed together to form a multiple junction box (see Fig 10), and a double initiating set is attached.

A pole or strut of suitable length with a "Y" notch at the top is required to hold the frame against the wall.

This charge will give a hole sufficiently large for a man to crawl through. It cannot be used against reinforced concrete walls, which require bigger charges, and should not be tackled by other arms without engineer advice.

In a case like this where speed is normally essential it is best to light the safety fuse with percussion igniters so that no fumbling with matches is necessary.

NOTE.—Remember that the blast effect of such a charge inside a room will be considerable. The firing party should give themselves time to retire at least behind a solid wall and if possible clear of the building, in case it collapses.

SECTION 12.—DEMOLISHING WALLS

A brick wall up to 9 in thick may be demolished by placing one grenade directly against it every 2 ft of its length. The grenades should be placed about 6 in up from the base of the wall and fired simultaneously by connecting the cordtex lead from each grenade to a main main along the base of the wall. The grenades may conveniently be held in position by lashing them to a board which can be stritted against the wall (see Fig 17).

For walls over 9 in and up to 18 in thick use a continuous line of grenades placed flat end to flat end. Every other grenade should be initiated with cordtex as already described. It is emphasized again that such charges are NOT sufficient for reinforced concrete walls. Fig 18 shows a thick masonry wall with a meeting charge of four slabs of 60 per foot run.

SECTION 13.—DEMOLISHING BUILDINGS— CONCUSSION CHARGES

Brick or masonry buildings can be demolished by blowing charges inside them. For good results close all doors and windows and block any apertures with sandbags, cloth or other available material. Use one grenade or the equivalent in anti-tank mines

or bulk explosive for every 100 cu ft of volume in the room of building. For walls over 1 ft thick multiply this charge by the thickness of the wall in feet. Detonate all charges simultaneously by the use of a cordtex ring main. In weakly constructed buildings (e.g., modern "jerry-built" villas) the actual position of the charges in the rooms is not important. In more strongly built structures split up the charges and place them against the strongest parts in the walls, e.g., external corners, chimney stacks, or (in large rooms) supporting pillars or piers. In bulk charges of this kind where several grenades are used in one charge, the grenades should be lashed firmly together and the two most centrally placed should be initiated. It is unnecessary to initiate each grenade, as the detonating wave will pass from one to another. For the destruction of reinforced concrete buildings, pillboxes and casemates, engineer advice should be obtained.

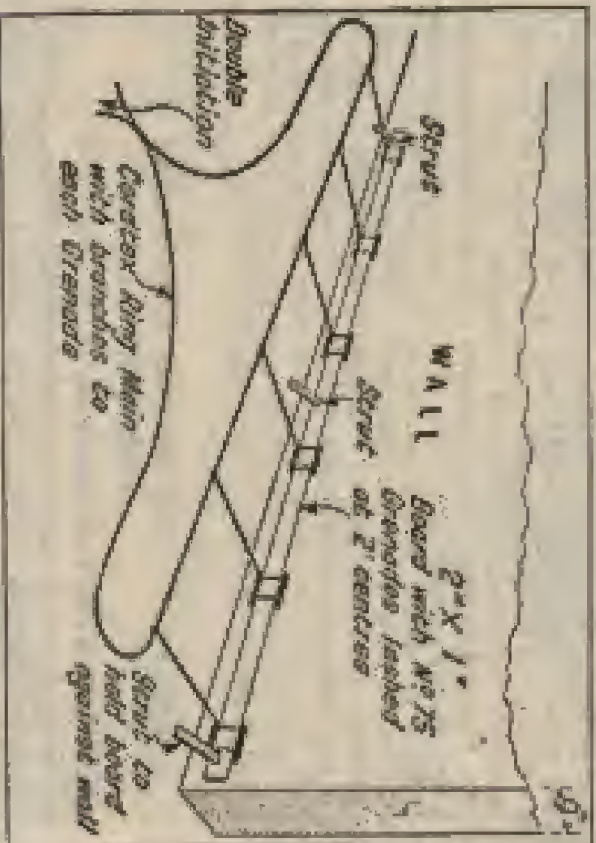


Fig 17. Demolishing a 9 inch brick wall

SECTION 14.—DEMOLISHING AVEs AND GUNS

A concussion charge consisting of a box of twelve 75 grenades or the equivalent in anti-tank mines or bulk explosives placed inside will put out of action any known AVE, pillbox, two grenades in the box with cordtex leads attached to a main lead which MUST be long enough to allow the safety fuse to be lit outside the tank. Close all hatches and other apertures, if it is not possible to place the charge inside place it outside against the turret ring and under the gun

Small field pieces, howitzers, anti-tank guns, etc., are best demoralized with "88s" pushed inside the breach. If this explosive is not available insert the round of ammunition, nose first into the muzzle and head another into the breach. Then fire the gun by remote control using a long cord or long lanyard. The fire should be behind cover. Methods of disabling guns, etc., when explosives are not available are given in Military Training Pamphlet No. 59 (1943).

SECTION 15.—CONSTRUCTION OF GUN PITS

Explosives may be used for loosening up hard or stony soil for the excavation of gun pits, mortar sites, etc. The method is NOT applicable to weapon sites, because the resulting excavation will be too wide and the loosening of the surrounding soil will make the pit useless as refuge from tanks. A rough guide is that each grenade burst about 2 ft will crater and loosen up soil for a radius of 2 ft and a depth of 3 ft. The grenades should be prepared for initiation as already described and buried vertically at about 3 ft centre, the cordless leads being brought to the surface and attached to a ring made as already described. Before blowing the final shape of the gun pit should be marked out on the ground by cutting a small channel 4 ins deep round the perimeter with a pick. After the grenades have been buried it is important that the excavated soil is put back and well strewned in the hole. Men should retire at least 50 yds and lie down or be behind cover before the charge is fired. The dimensions of the various gun pits or mortar sites will be found in the appropriate weapon training manual.

SECTION 16.—USE OF THE BANGALORE TORPEDO

1. Description (see Figs 18 and 19)

This is a prepared charge for attaching wire contacts. The torpedo now issued to infantry pioneer platoons is the Torpedo Bangalore 14-in, Mk 1 (see Fig 18). It consists of a light 14-in steel tube filled with HX and is supplied in 6-ft lengths weighing 14 lb each. Each tube has a male and female end with a single spring clip joint so that it can be slide up into the length required. A detachable bullet-shaped nose fits on to the front end of the torpedo to assist movement along the ground. The maximum length which can be conveniently pushed by hand is 100 ft.

The 2-in torpedo formerly issued weighed 25 lb per 5-ft length. Owing to its weight it has now been replaced by the 14-in. The 2-in torpedo may still be met in training and is illustrated in Fig 18.

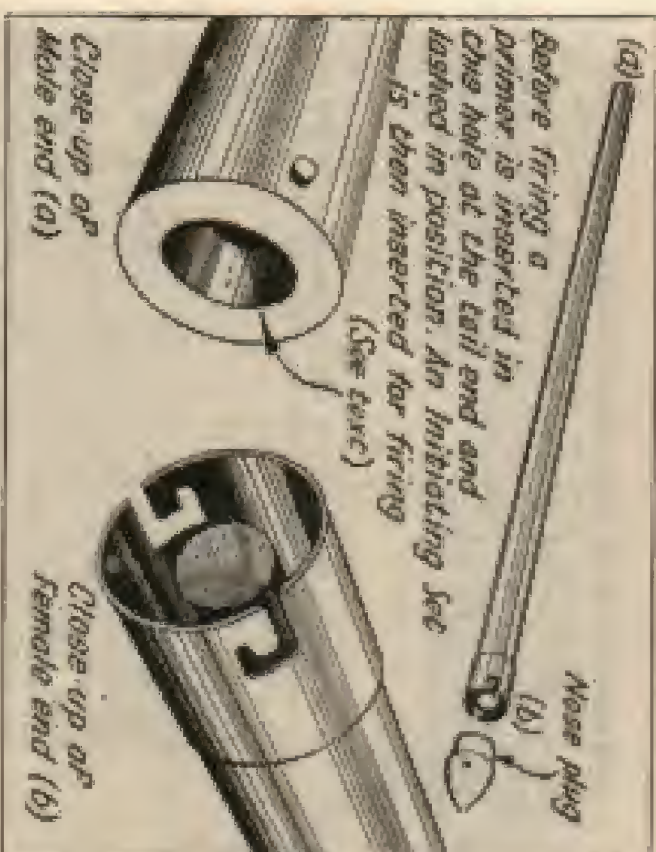


Fig 18. 2 in. Bangalore torpedo, Mk 1

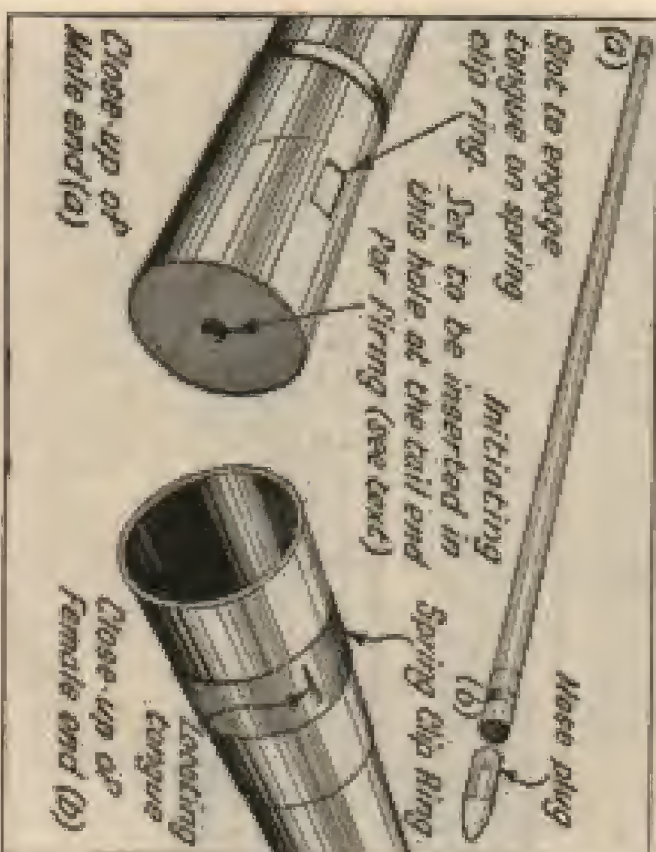


Fig 19. 14 in. Bangalore torpedo, Mk 1

2. Initiation.—Use an improvised initiating set composed of 1 lb. of detonating fuse fired by two detonator assemblies with detonator, safety fuse and igniter (see Fig. 11). Make these sets up previously with sealing tubes at both ends of the detonating fuse. In the 2-in torpedo Mk. 1 a primer is required; this fits into a recess at the made end of the tube. In the 1½-in torpedo a special primer is already in position; it contains a tube for the detonating fuse.

3. Effect

(a) **General note.**—The 1½-in torpedo will blow a gap at least 10 ft wide in the standard triple concrete, double apron or standard German wire fence. The size of the gap varies with the distance between pickets along the line of the fence. Torpedoes should be placed close to a line of main pickets. It should project on each side of the fence.

(b) **Against mines.**—The hangar-type torpedo after repeated trials has NOT proved an effective method of destroying mines. However, the crater formed by the torpedo in the center of the mine will be a remarkably safe line for men to use on foot. Top wires will almost certainly be cut and all personnel unless either detonated or thrown clear; but anti-tank mines may be only half-destroyed, rendered much more sensitive, and so act as anti-personnel mines. If there remains the gap should be searched for mines before troops are allowed to use it as a path through the fence. Obstacles may thus be avoided.

4. Safety distances.—None of the blast and fragments from a hangar-type torpedo travel sideways. For men lying down directly behind the torpedo, 20 yds may be taken as a safe operational distance. Fragments may travel 1,000 yds sideways but 100 yds may be taken as a safe operational distance for men lying down to the side.

5. Improvised hangar-type.—For wire fences up to 20 ft in width improvised torpedoes may be made up by loading 75 grenades Bal and to flat end to a 7-in by 1½-in board 2 ft longer than the width of the fence, every other grenade being initiated with a length of fuse attached to a main running the length of the board and detonated as already described (see para 2). This torpedo is rather awkward to push into place, but gives as good a gap as the 1½-in torpedo.

CHAPTER 4.—TRAINING

Section 17.—BATTLE NOISES

1. General.—It is not intended to lay down here the detailed setting for battle noises or the standing orders covering them, since these are normally dealt with by formation or battle school standing orders. The following notes describe suitable charges which can easily be prepared to simulate the effect of mortar, shell fire, etc., and the best methods of firing them.

2. Suitable charges.—75 grenades are not suitable for battle noises because fragments of the metal case and cover plate may fly a considerable distance. Use the standard 2½-lb battle noise or alternatively two slabs of C.E./T.N.T. or gun cotton or 2 lb of "808" initialed together and fired by a 1 oz primer. Such charges may be fired individually or simultaneously by detonating fuse or together from one firing point by the electrical method described in para 5 below. They should not be buried in or placed on hard or stony ground owing to the danger from flying shrapnel. If smaller charges are required, primers or single cartridges of "808" initialed by a primer, detonator and a short length of safety fuse (NOT shorter than 6 ins) may be used.

3. Booby traps.—Any of the switches described in Military Training Pamphlet No. 40, Part I (with a short length (6 ins) of instantaneous fuse inserted in the fuse extension) may be used in preparing harmless booby traps. These should be fixed up as they would be in operations, in hallings or dumps or on sewers.

4. Dump.—It will frequently be necessary to take precautions against damage in preparing battle noises and duck-up booby traps (see Sec 6). Every care must be taken to seal the ends of instantaneous fuse and connections with booby trap switches, using sand-lime tape and making waterproof. The free end of the fuse being capped by either a cap hose sealing and compound or an empty 303 cartridge case and tape.

5. Electrical firing.—It is frequently more effective to use battle noise charges electrically by remote control. For this purpose the following notes will be required:—

- Car batteries (Glorias and 15-amp trucks have 12-volt batteries. Light cars and motor cycles have 6-volt batteries).
- Signals cable electric 10,000 single low.
- Detonator electric 350, 250.
- Ignition safety fuse electric.

These stores are separately described below.

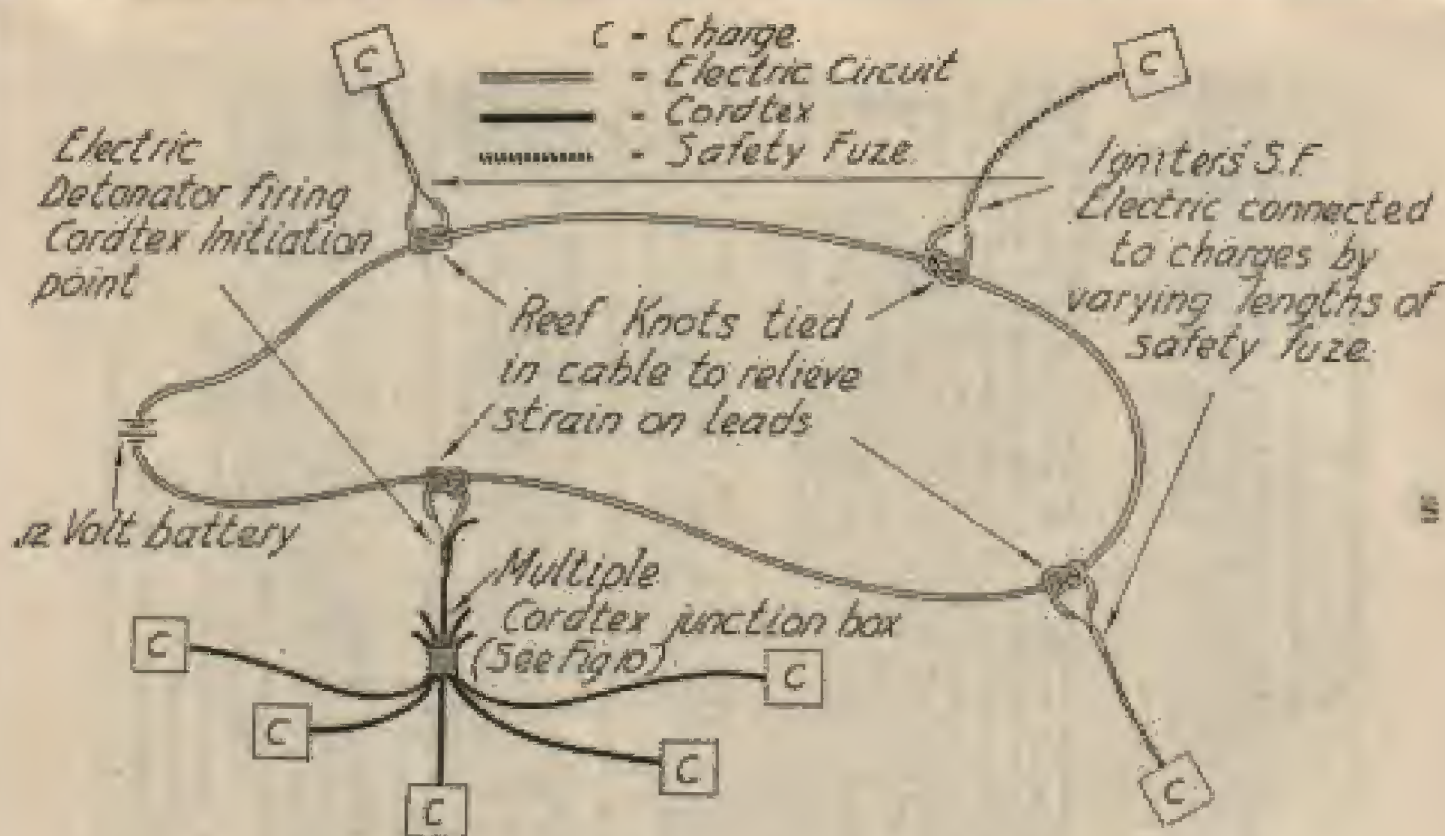


Fig 20. Diagrammatic layout of electrical circuit for battle noises

e. Detonator electric No. 33.—This consists of a No. 17 detonator (see Sec 5) with an electric firing head on the top. When an electric current of sufficient strength is passed through the head, a flash occurs which fires the detonator. A fully charged battery will produce sufficient current to fire a certain number of detonators connected in series with the battery through a given length of cable. The term "in series" means that the detonators are connected up by lengths of cable, the circuit starting at one terminal of the battery, passing through each detonator in turn and finishing at the other terminal (see Fig 20). Table 3 shows the number of No. 33 detonators or igniters which can be fired by standard 6- and 12-volt batteries through different lengths of cable, assuming batteries FULLY CHARGED.

TABLE 3

Capacities of batteries, firing electric detonators in series.

One 6-volt battery		One 12-volt battery	
Length of 100 B.L.E. cable electric " 10,000 single line "	Number of detonators No. 33 or igniter's safety fuse electric	Length of 100 B.L.E. cable electric " 10,000 single line "	Number of detonators No. 33 or igniter's safety fuse electric
30 yds	1	60 yds	1
100 yds	1	100 yds	1
		150 yds	1
		200 yds	1

One electric detonator may be used to fire several charges if the detonator is employed to fire a cordtex main (see Sec 5). Branches to the various charges can be taken off this main by using the type of clove hitch joint shown in Fig 7. In the case of battle noises a step main is not necessary.

7. Igniter safety fuse electric.—This is an electrical device for igniting safety fuse by remote control and is used mainly for battle noises. It consists of an electric firing head covered with match compound cemented into one end of a copper tube. Insert the safety fuse into the other end, and crimp the tube on to the fuse. When the current from the battery passes through the igniter head the match compound is ignited and a flash is produced which in turn ignites the safety fuse. If a number of such igniters are connected up in series with a battery as already described for detonators, and different lengths of safety fuse are attached to each igniter, a series of intermittent explosions will result.

8. Joining electric cable

- (a) Tie the two ends of the cable together with a reef knot, leaving the spare ends about 1 ft long. This serves as a strain on the joints.
- (b) Strip the insulation off these ends for a length of about 2 ins.
- (c) Place the two ends across each other at right angles, and twist them firmly together.
- (d) Bind the joint with insulating tape.

9. Joining electrical detonators with electric cable

- (a) Carry out instructions (a) and (b) in para 8 above.
- (b) Join the two ends of the cable to the two detonator leads by twisting them together to form two good joints.
- (c) Bind the two joints with insulating tape.

10. Firing electrical circuits.—The following precautions will always be taken.

- (a) Never insert electric detonator into charges until immediately before firing.
- (b) See that the batteries to be used for firing are kept in the control of some responsible person.
- (c) Do not bring the batteries near the firing cables until the charges are about to be fired.

Note.—Firing will be simplified if an improvised switch-board is incorporated in the circuit.

SECTION 1B.—SAFETY PRECAUTIONS IN TRAINING

These precautions will always be followed in demolition training. In operations they will be followed as far as practicable; in departing from them the officer in charge will be responsible for providing adequate protection against injury to personnel.

1. At every practice or demonstration with live explosives, no officer will be detailed who will be responsible for the practice and for the strict observance of all necessary safety precautions. If an officer cannot be present a fully qualified NCO instructor must be detailed.

2. For every such practice or demonstration a danger area of adequate extent will be established, and will be protected by sentries provided with red flags. Such sentries will be sufficiently numerous to prevent the entry of persons or livestock into the danger area. In addition, warning sentries will be posted on roads passing through the area to warn motorists, etc., of the position of the back-out sentries.

3. The officer in charge of the practice will ensure that the sentries understand their duties, that they can hear or see the signals from the control point, and that the area is clear before charges are connected up.

4. The following will be the normal extent of the danger area for various typical classes of practice with high explosives:—

- (a) For the firing of detonators, detaching fuse and fuses:—
If in the open 50 yds radius
- (b) For small charges up to 5 lb:—
In the open 50 yds radius
Buried 100 yds radius
- (c) For 75 lb grenades:—
In the open or buried 100 yds radius
- (d) For the firing of charges for cutting trees:—
800 yds radius
- (e) If cutting metal pipes, rails, steel plates, etc., fragments may fly up to 1,000 yds in all directions from quite small charges. This radius should clearly be taken as the danger area unless the demolition is carried out in a covered pit.

(f) Bangalore torpedoes. Four operational safety distances as Sec 16. Fragments fly chiefly at right angles to the axis of the torpedo up to 1,000 yds. 200 yds may be taken as safe when standing in line with the axis of the torpedo, and 100 yds lying down.

5. The above danger areas will apply to all troops and spectators in the open. Troops and authorised spectators may be allowed within the danger area only where adequate cover, proof against all splinters and shrapnel, is provided.

Frequently in training it is not convenient to accept the delay involved in withdrawing personnel to the distances given above. Natural cover will usually be available and should of course be used. The safety distances for personnel (but not property, livestock, etc.) may be reduced according to the nature of the cover, and safety distances for all purposes may be reduced according to the degree of risk which can be accepted under different conditions. In selecting cover due consideration must be given to the probable angle of descent and the size of the fragments anticipated.

6. The following precautions will be taken before the beginning of the practice:—

- (a) A length of safety fuse from each tin to be used will be tested for rate of burning.
- (b) All explosives, detonators, etc., will be placed under charge of a NCO with adequate assistance, who will be responsible

that they are not approached by unauthorized persons, that they are issued only as and when required and that the balance is placed in a position of safety before the charge is fired.

- (e) Sentries will be posted and instructed in their duties: the danger area will be cleared and cleaned.
- (f) All troops and spectators, as well as explosives, detonators, etc., other than those required for preparing the demolition, will be moved to a safe place.
- (g) Smoking within the "danger area" during the course of the practice will be forbidden.
- (h) All personnel will be warned that, when the charge is fired, they must, if in the open, look upwards for falling fragments, so that they can avoid any that fall in their vicinity.

7. The following precautions will be taken during preparation of the charge:—

- (a) The minimum number of persons will be employed for preparing the charge.
- (b) No instrument of iron or steel will be employed for tamping or otherwise loading the charge.
- (c) Detonators, before and after attachment to fuses and pending insertion in the charge, will never be left unattended.
- (d) Every man, as he can be spared, will join the party at the place of safety.
- (e) When the charge is ready, all personnel, other than the officer or NCO/JC, and the man detailed to fire the charge, will withdraw to the place of safety, to which all spare explosives will be sent.
- (f) Where several charges are to be fired separately by safety fuses, fuses will be arranged to fire at intervals of not less than 10 seconds. In such cases, two NCOs or men will be detailed to count the explosions. If a misfire is suspected the officer in charge will follow the procedure laid down in para 10.
- (g) Protection must be kept away from cables, and under guard, until the moment of firing.

8. The following will be the procedure before firing:—

- (a) The officer in charge will satisfy himself that the sentries are on the look-out, that the area is clear and that all troops and spectators are outside the danger area or under cover.

- (b) He will then signal visually or by whistle that firing is about to begin.

(c) On the acknowledgment of this signal by the sentries, he will give the signal to fire.

- (d) All personnel will wear steel helmets during firing of charges.

9. After the signal to fire:—

- (a) No person will enter the danger area or move from the place of safety until the officer in charge gives the "all clear" signal.

(b) Where several charges are to be exploded simultaneously, the officer in charge will not give the "all clear" signal until he has personally inspected the site, and has ascertained that all charges have fired.

10. In the event of a misfire, the following precautions will be taken:—

- (a) No one will normally be permitted to approach the charge until at least ten minutes have elapsed from the time of attempting to fire.

(b) The misfire will then be dealt with as a blind by the minimum number of personnel necessary. The charge will not be removed or touched unless it is absolutely necessary to do so.

- (c) If necessary, a charge which has misfired should be rendered harmless by placing and detonating a fresh charge close to it.

(d) The "danger area" will remain closed and all spectators, etc., under cover until the "all clear" is signalled on the completion of the removal or destruction of the misfire.

11. Four further rules should be observed at all times, particularly during instruction:—

- (a) All stores and explosives will be treated as "live" unless clearly marked "INERT" or "DUMMY".

All personnel must be made aware of the rule.

- (b) A list of exhibits will be kept and checked before and after firing. Every item will be accounted for before the class leaves.

(c) All actions will be performed deliberately, and the reasons stated. Personnel learn more quickly by eye than by ear; good habits will therefore be taught by example from beginning of training.

- (d) "Lumpsums" will never be mixed with "live".

CHAPTER 5.—DESTRUCTION OF BLINDS

SECTION 19.—GENERAL TECHNIQUE

1. **General.**—The object of this chapter is NOT to give detailed instructions on the destruction of all types of blinds or unexploded projectiles which may be encountered in the field, which is a subject far beyond the scope of this pamphlet. Nor is it intended to deal with unexploded aircraft bombs, which are an RF's responsibility. Special instructions for dealing with grenades and mortar bombs which fail to explode, are normally laid down in the various weapon training pamphlets and local range standing orders, etc., which should be read in conjunction with this chapter.

2. **Charges to be used.**—In the case of grenades use one primer laid alongside and in contact with the grenade and initiated with detonator and safety fuse. In the case of anything larger use two C.E./T.N.T. or gasolene sticks or 2 lb of "808" (but NOT 75 grenades) initiated by a primer, detonator and safety fuse.

3. **Method of disposal.**—In all cases place the charge so that it will detonate the filling rather than attempt to rupture the firing mechanism, e.g., in the case of anti-tank mines, place the charge in good contact with the side of the mine rather than on top of the spring mechanism.

In the P.L.A.T. bomb a specially sensitive fuse is used, and the charge should not be placed directly in contact with the bomb for fear of disarming it (see Small Arms Training, Vol. I, Paragraph No. 24, Projectile, Infantry, Anti-Tank (P.L.A.T.), 1943, for details).

4. Safety precautions (see also Sec 18, para 10)

- (a) Normally only one man will be required to deal with a blind. Therefore one man, preferably an officer, should deal with it, and other personnel should withdraw to a place of safety until the blind has exploded and the officer has given the "all clear" signal.
- (b) Where possible avoid moving blinds, etc., before destruction.
- (c) If blinds are well apart destroy them ONE AT A TIME.
- (d) If they are so close together that the blowing of one may cover others in debris or activate them by blast, destroy them simultaneously by firing the charges with confederate leads initiated together as already described in Sec 5.
- (e) See that all personnel, military or civilian, within range are warned beforehand and are under cover or out of range when the blinds are destroyed.
- (f) Unless orders are received to the contrary do NOT attempt to remove fuses from blinds.

(2) IF IN DOUBT LEAVE BLINDS UNTOUCHED BUT MARKED CLEARLY WITH A FLAG AND OBTAIN REASSISTANCE

CHAPTER 6.—ENEMY EQUIPMENT

SECTION 20.—GERMAN EQUIPMENT

1. **General.**—Occasions may arise in operations when our own supplies of explosives are short but large supplies of enemy equipment are available. Normally enemy equipment will be dealt with by the RF, but in case no engineer advice is available the following notes will be of assistance to other arms.

2. **Bulk explosives.**—These are in the form of prepared charges of high explosive, those most frequently met being the 100 gramme (4 lb), 1 kilogramme (2½ lb) and 3 kilogramme (6½ lb). They are made up in rectangular blocks with a black metal casing which has threaded holes which will take the German detonator-igniter assemblies. *Initiate as taught in last pamphlet for British explosives, using a 1 lb primer.*

In emergency they may be initiated without a primer by using German detonators, which are more powerful than the British No. 27, and fit into a small flakelike or metal detonator holder which can be screwed into the charge.

3. **Detonators.**—These are very similar in appearance to, and practically the same size as, the British No. 27. As already noted the filling is more powerful. They will fit into a British primer after it has been rectified.

4. **Safety fuse.**—This has a smooth black or chocolate cover and a black gunpowder core. Like British safety fuse it burns at approximately 2½ ft per minute. ALWAYS test the rate of burning before use. This fuse is in all respects except thickness interchangeable with British fuse; the outer covering must be stripped back to fit it into a British No. 27 detonator.

5. **Detonating fuse.**—This has a pale green or chocolate cover and a pale pink powder core. It is exactly the same diameter as cordite and the two fuses are interchangeable.

NOTE.—(1) IN CASE OF DOUBT WITH ENEMY EQUIP. MEET ASK FOR ENGINEER ADVICE.

(2) Cases have been uncovered recently of German demolition equipment being defective as a result of sabotage presumably in manufacture. All German demolition equipment, particularly fuses, should therefore be carefully examined and tested before use.

SECTION 21.—JAPANESE EQUIPMENT

1. **Bulk explosives.**—Most Japanese bulk explosive is in the form of small sticks 2 in by 2 in by 1 in. Ten sticks are packed in a paper package 21 in long. Alternate blocks in the package have a hole for a detonator marked on the paper wrapping by a black spot. There is also a type of plastic explosive made up in 4-oz cartridges which is similar to "BXB."

Warning as taught in the pamphlet for British explosives, using a 1-oz primer.

2. **Detonators.**—There are three sizes, the smallest corresponding in size and power to the British No. 27.

3. **Safety fuse.**—Japanese safety fuse is unreliable and should NOT be used.

4. **Detonating fuse.**—This fuse has a brown fabric cover with a diameter nearly the same as that of cordtex. In emergency it may be used in lieu.

Note.—(1) Japanese accessories are NOT so reliable as British and German equipment and their use should be avoided except in emergency.

(2) IN CASE OF DOUBT ASK FOR ENGINEER ADVICE.